REMARKS

Reconsideration and allowance of the present application are respectfully requested. Claims 1-11 remain pending in the application. By the foregoing amendment, claims 1 and 9 are amended; and claim 11 is added.

The Information Disclosure Statement filed January 26, 2005 has not yet been acknowledged. The Examiner is respectfully requested to acknowledge consideration of the cited references by return of an initialed copy of Form PTO 1449, attached.

In numbered paragraph 1, page 2 of the Office Action, claim 9 is rejected under 35 U.S.C. §101 as being directed to non-statutory subject matter. To obviate the rejection, claim 9 is amended as suggested by the Examiner. Withdrawal of the rejection under 35 U.S.C. §101 is respectfully requested.

In numbered paragraph 3, page 2 of the Office Action, claim 7 is rejected under 35 U.S.C. §112, first paragraph. Applicants traverse the Examiner's assertion.

Applicants have disclosed an exemplary stability indicator based on phasor measurements in EP-A-1 134 867 (specification at, e.g., page 13, lines 2-4). As exemplified in Fig. 3, a computation of security margin is adaptable to an overcurrent protection device 3a (specification at, e.g., page 13, lines 9-15). Another variant for adapting limit values is exemplified with a stability measure based on oscillations (specification at, e.g., page 13, line 17 through page 14, line 6).

The foregoing features are broadly encompassed by claim 7, which recites the steps of computing, from measured phasor values, a stability measure of the network; and adapting limit values in accordance with said stability measure.

Accordingly, clear and enabling support was provided for the recited claim features. Withdrawal of the rejection is respectfully requested.

In paragraph 5, page 3 of the Office Action, independent claim 1, along with all dependent claims, are rejected as being unpatentable over Chen et al., "A New Adaptive PMU Based Protection Scheme for Transposed/Untransposed Parallel Transmission Lines," IEEE Transactions on Power Delivery, Vol. 17, No. 2, April 2002, pp. 395-404, in view of Xia et al., "Adaptive Relay Setting for Stand-Alone Digital Distance Protection," IEEE Transaction on Power Delivery, Vol. 9, No. 1, January 1994, pp. 480-491. In paragraph 19, page 6 of the Office Action, dependent claim 7 is rejected as being unpatentable over the Chen et al. publication in view of the Xia et al. publication and EP 1 134 867 (Bertsch et al.). These rejections are respectfully traversed.

Applicants have disclosed methods for the protection of an electric power transmission network incorporating network "distance protection" features. As exemplified in Fig. 5, a remote zone z3 is primarily protected via local protection devices installed close to the zone. Redundancy can be provided in a straightforward way by simply doubling these devices. Alternatively, the previously-known "zone 3 functionality" of a distance protection relay at bus A offers protection of the remote zone z3 by adequate impedance settings (page 16, 2 paragraph).

The disclosed protection functionality further incorporates emulation of local protection functions for the redundancy or parallel working protection. For example, local protection functions are implemented by a plurality of local protection devices located at a first plurality of locations throughout the network. The local protection function evaluates local measurements provided by one (e.g. distance protection) or

more (e.g. difference protection) local devices, and determines a triggering signal as a control command according to the principles or algorithms of the respective local protection function. The emulation functionality, on the other hand, is based on measurements from phasor measurement units (PMUs) (and thus represents a more global aspect) that allow reconstruction of the aforementioned local measurements and their evaluation in a central processing device. The emulation allows phasor data reconstruction of the local measurements to emulate a redundant triggering signal as the one determined by the emulated local device. Accordingly, two or more control commands are issued redundantly following one particular (fault) event, and are executed according to a given (and potentially trivial) redundancy strategy.

As disclosed, "global-type" protection functionality can be afforded for the control of an electric power transmission network. For example, redundant "local" protection functions can be implemented by a plurality of local protection devices in combination with an evaluation of phasor data from phasor measurement units (PMUs) that may be installed for other purposes (e.g., page 3, line 18; page 9, line 13). This evaluation can operate in parallel to emulate the local protection functions. Accordingly, the applicant's disclosure uniquely incorporates emulation and redundancy of protection functionalities.

The foregoing features are broadly encompassed by claim 1, which recites, among other features, "measuring phasor data for voltages and currents at a second plurality of locations of the network, transmitting said phasor data to a central processing device, emulating, in the central processing device, local protection functions that are implemented in the local protection devices, and executing, in

accordance with a given redundancy strategy, control commands that are issued redundantly by the local protection devices and by the central processing device."

Regarding claim 1, the Examiner asserts at paragraph 8, page 4 of the Office Action, that "Chen et al. shows...emulating, in the central processing device, protection functions that are implemented in the local protection devices (Flow chart logic of Figure 1), and executing control commands ('issue tripping signal' – figure 1)." The Examiner's assertion is respectfully traversed.

The Chen et al. publication does not disclose emulation, by the central processing device, of local protection functions implemented in local devices. The adaptive protection scheme as disclosed on page 397, col. 2 comprises the steps of transmitting of phasor data (1), decoupling of phasor data due to the fact that parallel lines are being observed (2), computing fault location indices (3), distinguishing of internal from external faults (5), identifying the faulted line in case of internal faults (6) and taking a tripping decision (7). However, the Chen et al. publication does not teach or suggest emulating local protection functions in a central processing device to implement a redundancy strategy as claimed. At least for these reasons, the Chen et al. publication does not disclose or suggest the subject matter of claim 1.

The Chen et al. publication discloses using two adaptive phasor measurement units PMUs to provide direct measured phasor data from bus A and bus B at the respective ends of parallel transmission lines (Fig. 1), from which the fault location index D, giving the fault point between bus A and bus B, is calculated (equation 1). In contrast to the Applicants' disclosed (E_1, Z_{1e}, Z_{2e} and E_2) variates, as disclosed by the Chen et al. publication, the "external" part of the network, i.e., the sending and receiving end to the left and to the right of the protected parallel lines (Fig. 2), is

represented by respective invariable Thévenin equivalents (page 399, col. 2, §V(A)(1)).

Regarding claim 3, the Examiner asserts at paragraph 12, page 5 of the Office Action, that "Chen shows wherein a protection function emulated in the central processing (2) device is a distance protection function." The Examiner's assertion is traversed. In contrast to the applicant's disclosure of a "distance" protection system (page 17, line 19), the Chen et al. publication discloses a "differential" protection system, as it protects a part of the network in between two PMUs. For example, step 7 as disclosed by the Chen et al. publication (page 397, col. 2) does not suggest a distance protection, but merely discloses a tripping decision for an internal fault located on the protected lines between bus A and bus B. Further, in step 5 of the Chen et al. publication (page 397, col. 2), internal faults are distinguished from external faults for which no action is taken and the scheme returns to the evaluation of the next data, e.g., Fig. 1, shows branching "NO" decision paths. Accordingly, the Chen et al. publication does not teach or suggest a distance protection function.

The Xia et al. publication, considered individually or in combination with the Chen et al. publication, does not cure the deficiencies of the Chen et al. publication. The Xia et al. publication discloses an adaptive scheme for digital distance relay setting with the aim to automatically respond to changing network conditions. The disclosed scheme uses only slow-speed responses of SCADA systems (page 480, col. 2, paragraph 3, line 6), which is inaccurate and slow to adapt to varying line and load situations. The Xia et al. publication does not teach or suggest emulation, by the central processing device, of local protection functions implemented in local devices. Hence the Xia et al. does not cure the deficiencies of the Chen et al.

publication and Applicants' claims are allowable over these documents regardless of whether they are considered individually or in combination.

The Bersch et al. patent publication, considered individually or in combination with the Chen et al. publication, does not cure the deficiencies of the Chen et al. publication. The Bersch et al. patent publication was cited for its disclosure of determining a stability margin value of the transmission network, but the Bersch et al. patent publication does not teach or suggest emulation, by the central processing device, of local protection functions implemented in local devices.

Claim 11 similarly recites "emulating, based on phasor data for voltages and currents measured at a second plurality of locations of the network and transmitted to the central processing device, local protection functions that are implemented in the local protection devices, and issuing control commands that are redundant with control commands issued by the local protection devices." At least for the reasons discussed above, the Chen et al. publication does not teach or suggest the recited claim feature, and the Xia publication and the Bersch et al. patent publication, considered individually or in combination with the Chen et al. publication, do not cure the deficiencies of the Chen et al. publication.

As such, Applicant's independent claims 1 and 11 are allowable. The remaining claims variously depend from independent claim 1 and recite additional advantageous features which further distinguish over the document relied upon by the Examiner. As such, the present application is in condition for allowance.

All objections and rejections raised in the Office Action having been addressed, it is respectfully submitted that the application is in condition for allowance and a Notice of Allowance is respectfully solicited.

Respectfully submitted,

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Attachment:
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